DOCUMENT RESUME

ED 095 727 HE 005 745

AUTHOR	Hartman, Robert W.
TITLE	Financing the Opportunity to Enter the "Educated Labor Market." General Series Reprint No. 285.
INSTITUTION	Brookings Institution, Washington, D.C.
PUB DATE	74
NOTE	29p.
AVAILABLE FROM	Publications Sales, The Brookings Institution, 1775 Massachusetts Avenue, N.W., Washington, D.C. 20036 (Free)
EDRS PRICE	MF-$0.75 HC-$1.85 PLUS POSTAGE
DESCRIPTORS	*Educational Economics; *Educational Finance; *Employment Opportunities; *Higher Education; Job Market; *Labor Market; Manpower Needs; Student Loan Programs

ABSTRACT

In 1980, about 1,100,000 newly minted bachelor's and first professional degree holders will enter the labor market if past trends continue. The financing patterns for higher education that develop in the next decade may be expected to have an impact on the characteristics of these new labor-supply entrants. The first part of this paper describes some alternative patterns of higher education financing that may emerge in the 1970's. The second section deals with how each alternative may be expected to affect three characteristics of the highly educated labor supply: their number and educational attainments, their socioeconomic backgrounds, and the appropriateness of their training for the manpower demands of the future. The third section contains an analysis of job preferences and labor force effort and participation rates, with an emphasis on the effect of student loan financing on these characteristics. Finally, the fourth section contains an evaluation of the previous parts and a discussion of the policy implications. (Author/MJM)

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Financing the Opportunity to Enter the "Educated Labor Market"

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by **ROBERT W. HARTMAN**

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13. *Financing the Opportunity to Enter the "Educated Labor Market"*

by Robert W. Hartman

In 1980, about 1,100,000 newly minted bachelor's and first-professional-degree holders will enter the labor market if past trends continue (U.S. Office of Education, 1971*a*, table 21, p. 42). The financing patterns for higher education that develop in the next decade may be expected to have an impact on the characteristics of these new labor-supply entrants. Specifically, one would expect the following characteristics of the highly educated labor supply to depend at least in part on the financing patterns that emerge:

1. Their number and educational attainments (in years of schooling)
2. Their socioeconomic backgrounds
3. The appropriateness of their training for the manpower demands of the future
4. The preferences for occupation and job qualities such as cash versus nonpecuniary returns, the timing of income receipts, and the willingness to enter risky fields
5. Labor force effort and participation rates

The first part of this paper describes some alternative patterns of higher-education financing that may emerge in the seventies. The second section deals with how each alternative may be expected to affect the first three characteristics just listed. The third section contains an analysis of job preferences and labor force effort and participation rates, with an emphasis on the effect of student-loan financing on these characteristics. Finally, the fourth section contains an evaluation of the previous parts and a discussion of the policy implications.

ACKNOWLEDGMENT: I would like to thank Daniel Sullivan for research assistance, and Henry Aaron, Robert Berls, Bruce Johnstone, and Robert Reischauer for many helpful comments.

THREE MODELS OF FINANCING HIGHER EDUCATION IN THE 1970s

In addition to the value of the time that students devote to their studies, the principal costs of higher education are borne by state and local governments, federal government, and by students (and their families). Each of these three major sources of funds has developed a distinctive style of financing in the past, with the state and local governments relying mainly on institutional support, the federal government increasingly relying on student aid (if we exclude research support—as we will throughout this paper) and students relying mainly on family resources.[1]

The decade of the seventies is almost certain to involve an absolute expansion in each of these sectors, and the major policy issues turn on which sectors will advance the most rapidly. For expository purposes, I will outline here three pure forms of financing in the coming decade, in each of which one of the three sectors is assumed to expand most rapidly.

State and Local Support

State and local governments provided 38 percent of current fund income for educational and general purposes of all institutions of higher education in 1968–69 and 58 percent of public institutions' budgets (Berls, 1971, tables 1 and 2). Moreover, in the 1960s the fastest growing sector of higher education—junior and community colleges—was supported predominantly by state and local sources of finance.[2]

State and local governments provide most support through institutional grants that result in low student charges. Student aid from state governments accounted for less than $200 million of support in 1969–70 (Carnegie Commission, 1970, p. 83). More-

[1] In 1966–67, state aid for higher education was a little over $4 billion (Becker, 1970, p. 101), of which $83 million (Hansen, 1970, p. 47) went to state scholarships. In the same year, local support was only $529 million (Becker, 1970, p. 101), nearly three-quarters of which went to two-year public schools. By comparison, total federal nonresearch outlays equaled $1.4 billion, of which student aid constituted 54 percent. By 1971–72, the student-aid share had risen to over 70 percent of the total. (U.S. Budget Bureau, 1968, p. 97; and 1972, p. 128). On student resources, Hansen cites a number of studies, all of which show that parents are the principal source of students' private finances (see Hansen, op. cit., pp. 44–45).

[2] While total enrollment slightly more than doubled from 1960 to 1969, enrollment in two-year colleges more than tripled (U.S. Office of Education, 1971*a*, table 5, p. 22). In 1968–69, state and local support represented nearly two-thirds of the total budget and more than 70 percent of the "Education and General" budget of two-year institutions (U.S. Office of Education, 1970, tables 1 and 2, p. 15).

over, the state and local grants have been reserved almost exclusively for publicly supported institutions, although there are a few exceptions.

Thus, if state and local support becomes more dominant in the 1970s and if it takes on the forms of the past, we can expect by 1980: (a) growth of the public sector in higher education, (b) growth of two-year colleges, (c) little expansion in student aid, and (d) relatively low student charges in the public sector.

Federal Government Support

It is difficult to characterize federal support for higher education in any one way. However, in recent years (omitting research) there has been a growing emphasis on student-aid programs. Within the student-aid category, the greatest growth has taken place in student-loan programs, especially in the subsidized guaranteed loan program.

The changing pattern of federal support for higher education is shown by the following:

Federal nonresearch outlays for higher education (in millions)

	Fiscal year	
Type of support	*1967*	*1972*
Student support	760	3,696
Institutional support	646	1,487

SOURCE: U.S. Budget Bureau, op. cit.

In the same years, the budget for the Office of Education was as follows:

Office of Education budget (in millions)

	Fiscal year	
Program	*1967*	*1972*
Educational opportunity grants	111,268	175,300
College work-study	134,099	402,700
Direct loans (NDEA)	179,122	293,000
Insured subsidized loans:		
Budget	15,632	203,571
Loan volume (est.)	(284,000)	(1,178,000)
Total student aid	440,121	1,079,176
Total institutional aid	581,058	279,860

SOURCE: U.S. Budget Bureau (1969, pp. 399, 407, and 1972, pp. 441, 447), and *The Congressional Record* (1971, pp. S-13445-6).

One possible outcome for the 1970s, therefore, is that the federal government will step up its support relatively rapidly through the vehicle of guaranteed student loans. However, I have argued elsewhere that a considerable shift toward emphasis on loans is highly unlikely unless major changes are made in the federal loan program (see Hartman, 1971, Ch. 4). We thus have to seek out alternative possible growth paths for the federal government. (Loans will be considered below.)

In May 1972, Congress passed a new comprehensive higher-education act that extended existing federal programs and added several new ones. Most prominent among the new programs is a broad need-based student-grant program and a program of universal grants to institutions.[3] The act is similar to the approach advocated in recent years by the Carnegie and Rivlin reports.[4] The Basic Opportunity Grants Program entitles students to a maximum amount of $1,400, with lesser payments scaled to ability to pay; the Institutional Aid Program is a combination of cost-of-education allowances and enrollment-based grants. This act was an authorizing bill; and, given a limited federal budget, we must await future appropriations actions to see in what direction federal support actually moves.

Since the federal institutional-grant program would have effects similar to the state-aid model described above (except that it would be less concentrated on public institutions), we will use the student-grant version of federal-program support as the second of our three models.

A policy shift toward a need-based grant program could be expected to affect institutional characteristics as follows:

1. Tuition fees in general and especially at public institutions would increase, since lower-income students would be able to pay more of the freight than at present.
2. Thus, there would be a more balanced growth of the public and private sectors.

[3] See U.S. Congress, Bill S.659 ("Education Amendments of 1972"), 92nd session, passed May 1972. Title I, part D, subpart 1 contains the Basic Opportunity Grants Program. Title X of the act contains the Institutional Aid Program.

[4] See The Carnegie Commission on Higher Education (1970). Also U.S. Dept. of Health, Education and Welfare (1969).

3 The relative growth of two-year public colleges would probably not be as great as it would be under the state expansion model.[5]

Private Share

The third alternative for the decade is the residual of the first two. If state, local, and federal institutional grants do not expand and if a federal student-grant program is not adequately funded, student charges will rise dramatically and the burden will be shifted to the private sector. Such a shift to the private sector will necessitate changes in capital markets for students.

Few families can afford to meet rapidly rising student charges out of current income. Fewer are provident enough to have saved for the kind of rainy day implied by a substantial shift to student financing. Existing loan programs limited to loans of relatively short (up to 10 years) maturity are not adequate to provide reasonable financing for students who accumulate substantial debts (see Hartman, 1971, Ch. 2).

At a minimum, then, a shift of burdens to the student will require the institution of capital market instruments that are of long maturity, from 20 to 40 years. However, conventional (fixed contractual repayment) debt of large magnitude per student may still impose unreasonably burdensome repayments on all students in their early postgraduate years and on some students who enter low-paying careers. For this reason, and in order to spread the risk of higher education investment, it seems likely that income-contingent (where repayments are based on income) loans would be introduced under such a financing strategy.[6]

Pursuit of a loan strategy would result in institutional growth characteristics similar to those listed under the need-based grants policy—greater reliance on tuition revenues and a more balanced public-private growth pattern.

PROBABLE EFFECTS OF THE THREE ALTERNATIVE MODELS

How would each of the models discussed in the previous section affect the number and educational attainments of the college population, their socioeconomic backgrounds, the appropriateness of the training received?

[5] For a more detailed analysis of the effects of the Education Amendments of 1972, see Hartman (1972*b*).

[6] For an excellent discussion of such loans, see Johnstone and Dresch (1971).

Number of Students and Educational Attainment

The decision to enter college is based in part on financial considerations, one major element of which is the net cost imposed on the student. Of the three scenarios described above, the expansion of the private-share route imposes the largest charges on users of higher education and could be expected to result in the smallest growth in student enrollments over the coming decade. It is conceivable that by making access to large capital sums available to students, the enrollment-deterrent effects of higher net costs could be overcome (see Hartman, 1972). But the parameters of this trade-off are not known and the presumption that higher net cost to users will deter enrollment seems reasonable.

Expansion of state and local institutions or federally funded institutional aid probably rank next in line in weakness of enrollment effects. The effect of both of these programs is to lower charges (or raise quality for a given charge) for students across-the-board. That is, an institutional grant enables the college to postpone or reduce increases in student charges or to expand the services it offers for the higher charges. Such programs must be inefficient in terms of enrollment stimulation if it is true that the marginal enrollment response to a given change in charges (or quality) differs among students. If there are such differences, the across-the-board tuition reduction (quality enhancement) results in small or no enrollment effects for the student groups whose marginal response is low. For example, if, as some have argued, children from wealthy families would attend college even if charges were raised substantially (see Hansen & Weisbrod, 1971), then that part of institutional grants that results in tuition reduction for the wealthy results only in a rent for that group, not in enrollment enhancement (Hoenack, 1971, pp. 302–311).

Finally, we come to the financing strategy for federal student grants. If we accept the hypothesis that a dollar of subsidy to higher education is most likely to generate a new enrollee if that subsidy is given to students from low-income families, then a Carnegie or Rivlin type of need-based student-aid program would serve to generate the largest enrollment effects. It is worth noting here that this behavioral relationship has not been fully tested, but what little evidence exists supports the hypothesis (ibid.). The addition of a cost-of-education allowance in the Carnegie-Rivlin proposals and in the Pell Bill might also serve as an extra enrollment inducer. Under these proposals, institutions would be eligible for federal payments in proportion to the grants made available to students in the institution under the federal program (or to the number of

recipients under the Pell Bill).[7] An institution therefore would, in a sense, be receiving a bribe to admit lower-income students. If admissions rules would serve to limit enrollments of low-income students under a student grants-only approach, the cost-of-education allowance might reduce such barriers since the poor enrollee carries a bonus with him.

Educational attainment is a function not only of entry into college but of persistence rates once enrolled. There is some evidence that persistence is less a function of financial circumstances than is enrollment (see Jaffe & Adams, 1970, p. D-15). To the extent that persistence is independent of financing, the above comments about enrollment would apply to educational attainment as well. However, a few additional points can be made.

First, we do not really know how a student's decision to persist would be affected by his acquiring large debt positions. It would seem likely that under conventional, 10-year loans of the type now extant, a student's willingness to continue his schooling for an extra year might diminish unless the earnings increments from the extra schooling could be realized within the repayment period. Judging by cross-section comparisons of earnings for people with exactly four years of college versus those with one to three years, much of the increment accrues to the more highly educated student *late* in his working career.[8] Thus heavy reliance on short-term conventional loans might significantly reduce persistence rates.

[7] The Pell Bill has a very unusual cost-of-education allowance. The bill specifies that the payment vary between schools of different overall enrollments, with the smaller institutions getting an advantage. Then, within any size class, the legislation provides for an unusual "notch," designed, it would seem, to make it very attractive for an institution to attract at least 5 to 10 percent of its enrollment from the poorer sectors of the population. For example, for institutions with enrollments of 5,000 to 10,000, the bill provides an institutional payment of $200 per recipient of federal student aid up to 499 such recipients. Once the school enrolls 500 such recipients, the federal institutional payment becomes $185,000.

[8] 1970 census data, for males, show the following pattern:

Age group	*Difference in median incomes for year-round full-time workers with 1–3 years vs. 4 years of college*
25–34	$1,505
35–44	2,603
45–54	3,203
55–64	2,025

SOURCE: U.S. Bureau of the Census (1971, table 49, pp. 102–104).

Second, all studies of persistence seem to show a decidedly lower rate for students who attend two-year colleges than for other institutions.[9] To some extent these findings merely reflect the ability mix typically found in two-year colleges. However, if the nature of the institution itself has an independent effect on persistence,[10] all financing strategies that maximize growth of two-year colleges will at the same time raise drop-out rates.

In summary, of the broad financing alternatives outlined in the previous section, there is reason to believe that the quantity (number of people times years of attainment) of highly educated labor will be least, the greater the emphasis on private support without public subsidies. Institutional-grant programs through states will tend to generate relatively greater enrollments, but their effects on labor supply will be lessened if persistence rates are reduced by an increased inflow into junior colleges. Need-based student-grant programs, funded by the federal government, would probably produce the largest increment in the highly educated labor supply, since the subsidies would be targeted on those whose decision to enroll is most likely to be affected.

Socioeconomic Status

The effect of higher education financing on the socioeconomic status of the student body has received extensive discussion and there is no reason to repeat the discussion here.[11] For the most part the results would parallel the enrollment effects just discussed. Students from low-income families are least likely to get a college education if the cost burden is shifted to them from taxpayers, if subsidies are higher for rich kids than for poor ones, and if loan programs are so designed that large repayments are required in early postcollege years. A shift toward increasing the private share of college financing accompanied by access to long-term income-contingent loans may result, as I have argued elsewhere, in a deterrent to enrollment of low-income students compared to the present. To the extent that low-income students do enroll, they are more likely to borrow than children from wealthy families simply because fewer financing alternatives are available to them. This might present a problem of adverse selection to a loan plan if future income

[9] See, for example, Jaffe and Adams (1970, p. D-5).

[10] As claimed by Folger, Astin, and Bayer (1970, pp. 176–177) and by Astin (1972).

[11] See, for example, Carnegie Commission on Higher Education (1970); U.S. Department of Health, Education and Welfare (1969); and Hansen and Weisbrod (1971).

of the student is correlated with family income.[12] Only under a program emphasizing need-based student grants could one feel any confidence that the socioeconomic composition of student bodies would shift toward lower-income groups.

Appropriateness of Training

The economy's manpower requirements are determined in part by exogenous technological and consumer-preference changes and are satisfied in part by equilibrating labor market forces. Training institutions successfully fulfill manpower needs if they produce embodied skills in line with technological and preference changes and do not produce skills that would seriously distort long-run normal wage levels or cause substantial instability in labor markets.

Much of the job of choosing which skills to acquire rests on the student, and Freeman (1971) has shown that students seem to know what they are doing in making career decisions. On the basis of his evidence, one would expect that financing systems that maximized the student's freedom to choose among institutions as well as to choose the kind of training within a particular school would be most conducive to efficient channeling of labor supply toward manpower needs. Those financing thrusts that emphasize student aid (grants or loans) would most directly fulfill this criterion.

In addition the student-grant or loan approaches would probably induce a rethinking of internal pricing by colleges and universities, leading perhaps to a greater correspondence of prices with costs for various levels and disciplines. Although such changes could be expected to increase the long-run rationality of the training-allocation process, the short-run effects could be destabilizing. Such destabilization would result if, as seems likely, charges for fields in which there are shortages (medicine) were raised relative to those in which manpower surpluses exist (literature).

Institutions themselves may play a role in the career choice and skill-training patterns of their students. If institutions are sluggish in their response to market signals and do not offer courses providing new skills, the labor supply response will be correspondingly sluggish. At least four influences leading to poor institutional responsiveness have received some attention:

1 The tradition of academic elitism that operates to force curricula designed for academic careers on students who have neither the capacity nor inclination for such careers (see Jencks & Riesman, 1968, Ch. 3)

[12] See Hartman (1972), especially part 2. Also see paper by Marc Nerlove (1972).

2 The lack of incentives for institutions to care about student futures when the student plays no major role in paying for his education (see Buchanan & Devletoglou, 1970)

3 The overbearing inertia of the large bureaucratic structure of the modern university (see U.S. Office of Education, 1971*b*, pp. 30–35)

4 The influence of coordinating bodies and accrediting agencies whose influence seems in part to foster uniformity among constituent institutions (ibid., p. 82)

If these factors are significant determinants of the ability and willingness of institutions of higher learning to adjust to changes in labor market conditions for their graduates, the various financing plans have predictable effects.

The financing programs that emphasize payments via the student are most likely to produce competition among institutions, and to turn internal incentives more toward concern for student welfare. By contrast, programs such as institutional grants through the states would tend to strengthen monopoly forces and would probably increase the bureaucratic nature of the college enterprise. At a minimum, it would seem that the burden of proof that institutional support—rather than student aid—is more conducive to labor market responsiveness lies with the adherents of that form of support.

JOB PREFERENCES AND LABOR FORCE PARTICIPATION

Career choices are very complicated. I was very ill as a young child and was told I was saved from the grave by a doctor. It seemed safest to become my own doctor; a surgeon cousin of mine was venerated in the family. I also identified with my ambitious mother who, if she had not struggled so hard merely to survive, would have had a career of her own. I always knew I wanted to work, have my own money and independence—I originally couldn't decide between becoming a modern dance choreographer or a doctor. I became a doctor, in part, because I chose a field my talented brother could not enter. He's very afraid of blood. (An anonymous child analyst, quoted in Roiphe, 1972, p. 66.)

Career Choice

Financing may play only a small role in choice of careers, but the pattern of choices will determine labor supplies in the various markets for highly educated labor. In this section we will discuss the differences in career choice between financing arrangements that

NOTE: Many of the points in this section were stimulated by my reading of Richard Freeman (1971).

Under conventional loans (those in which repayments are fixed and independent of income), the career-choice options are changed in the income panel. Careers I and II will each be expected to yield x dollars less than previously, where x is the annual repayment. Since $a - a'$ must be smaller than $c - c'$, it follows that the previously indifferent student's choice will be altered by the introduction of loan financing: he will now choose career I, with its relatively high monetary returns and relatively low nonpecuniary returns.

Alternatively, if income-contingent loans were to be introduced into the original situation, we could not make an unambiguous prediction about the pattern of career choice. Under most of these proposals, borrowers repay a given fraction of their gross income for each unit of borrowing. If career II carries a repayment of x, then career I will require larger repayments, say $x + x'$. Whether $a'' + b$ is greater than $c' + d$ depends on the rapidity of the rate of decline of the marginal utility of money income in the income ranges around the careers in question. Income-contingent loans may not induce previously indifferent people to switch to high-paying careers (as a conventional loan would) simply because they will bear a larger tax burden at higher incomes.

One interesting aspect of income-contingent loan programs could reverse the ambiguity just noted. Most income-contingent loan proposals involve a maximum payment, such that if a borrower's lifetime income exceeds a certain amount, no extra repayment is required.[13] It follows from the above analysis that a student evaluating alternative careers *all of which fall in the income range where maximum payments would occur* would tend to shift his choice toward those careers that are remunerative in income, since a fixed-dollar-repayment liability is associated with each alternative.

The diagrams have overstated the range of choice for most college students. Real career choices are made, and switches occur, in a fairly narrow range of alternatives. Many, and perhaps most, career choices would be unaffected by modest debt accumulations. Nonetheless, loan finance would tend to shift labor supplies, on the margin, toward careers and jobs with higher ratios of income to nonpecuniary qualities, except possibly in the case of income-contingent loans over some ranges of income.

[13] See Karl Shell, et al. (1968, pp. 2–45). Also, Dresch and Goldberg (1972, pp. 59–92), and Johnstone and Dresch (1971).

Timing of Cash Receipts

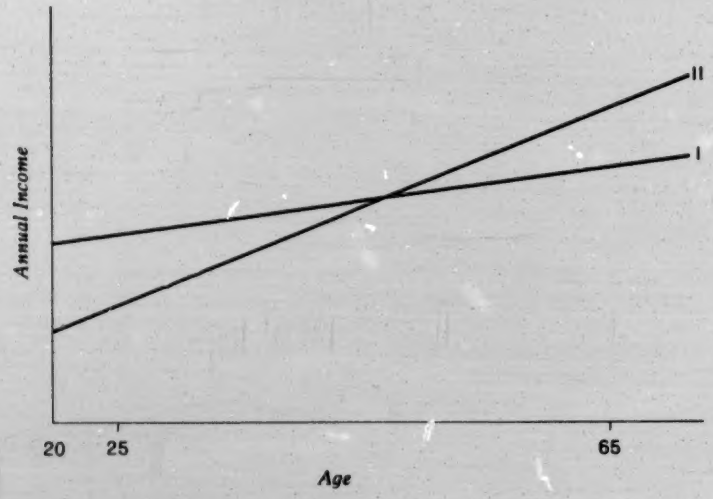
Careers chosen by college-trained people differ in terms of the temporal pattern of incomes received. Ignoring nonpecuniary aspects of careers, students presumably choose among the alternative-career income streams by computing the present values at their subjective rate of discount.[14] Figure 13-2 illustrates two alternative careers. In career I, income (net of ordinary taxes) starts at a relatively high level and rises gradually through a working lifetime, while career II features low starting pay but large salary increments.

Suppose a student is financed by the state and has to choose between these two careers. Assuming a 45-year time horizon in each case, he would compare the present value of the two occupations. He will prefer occupation I if the present value of the 45 annual incomes, discounted at the subjective discount rate, exceeds a similar computation for career II.

How will any student's ordering of careers differ if loan financing replaces subsidized higher education?

First, suppose both careers are financed under conventional loans of identical size with a maturity of 45 years. (The maturity does not matter.) Then each income stream will have to be reevaluated in such a way that R dollars in repayments is subtracted in each year. The effect of this reevaluation *on the ranking of careers I and II is*

FIGURE 13-2



[14] See the discussion in Freeman (1971), especially p. 86ff.

nil. If career I would have been chosen before loans, it will still be chosen; if career II had a higher present value before borrowing, it will still have a higher present value.[15]

Of course, if career II starts at low income because it involves more schooling than career I (e.g., career II is Ph.D. biologist and career I is B.A. biologist), and if career II therefore requires larger education debt accumulations by the student, patterns of choice will change. Specifically, career II becomes less advantageous than career I under these conditions. But this is simply to say that once a larger part of the cost of education is shifted to the student there will be some discouragement to additional schooling. Given the discouragement, choice among careers with different temporal patterns is unaffected by conventional loans.

Less obviously, the choice between careers I and II is unaffected by income-contingent loans as well. Suppose an income-contingent loan program were in force and that for each of the 45 working years a borrower had to give up the fraction $(1 - s)$ of his income to requite his educational borrowing. In assessing income streams I and II, the prospective career entrant would recompute his posttax income such that it equaled the fraction s of its previous value. It can be shown that such a transformation of the income streams I and II would leave the choice ordering unchanged from its previous

[15] Let income from career I in year i be denoted by Y_i^{I}, and from career II by Y_i^{II}. Then $Y_i^{\mathrm{I}} = \mathrm{I}_0 + mi$, where I_0 is the initial salary for career I, m is the annual raise, and i is the career year ($i = 0, 1, 2, \ldots$). Similarly, $Y_i^{\mathrm{II}} = \mathrm{II}_0 + ni$. Then, if R is the annual loan repayment, $Y_i^{\mathrm{I}'} = \mathrm{I}_0 - R + mi$, and $Y_i^{\mathrm{II}'} = \mathrm{II}_0 - R + ni$. Letting PV_{I}, PV_{II}, $PV_{\mathrm{I}'}$, and $PV_{\mathrm{II}'}$ stand for the respective present values, that $PV_{\mathrm{I}} > PV_{\mathrm{II}}$ implies $PV_{\mathrm{I}'} > PV_{\mathrm{II}'}$ can be shown as follows: $PV_{\mathrm{I}} > PV_{\mathrm{II}}$ means

$$\sum_{i=0}^{45} \frac{\mathrm{I}_0 + mi}{(1 + r)^i} > \sum_{i=0}^{45} \frac{\mathrm{II}_0 + ni}{(1 + r)^i}$$

where r is the individual's subjective rate of discount. If the positive quantity $\sum_{i=0}^{45} \frac{R}{(1 + r)^i}$ is subtracted from both sides, you get

$$\sum_{i=0}^{45} \frac{\mathrm{I}_0 + mi}{(1 + r)^i} - \sum_{i=0}^{45} \frac{R}{(1 + r)^i} > \sum_{i=0}^{45} \frac{\mathrm{II}_0 + ni}{(1 + r)^i} - \sum_{i=0}^{45} \frac{R}{(1 + r)^i}$$

or $\sum_{i=0}^{45} \frac{\mathrm{I}_0 - R + mi}{(1 + r)^i} > \sum_{i=0}^{45} \frac{\mathrm{II}_0 - R + ni}{(1 + r)^i}$ which is $PV_{\mathrm{I}'} > PV_{\mathrm{II}'}$ Q.E.D.

level.[16] (If the reader has trouble with the intuitive plausibility of the findings in this section, he might consider whether a head tax [conventional repayment] or an increase in the price level [income-contingent tax] would affect the choice between careers of different temporal patterns).

The tax treatment of income-contingent repayments complicates matters. Under our tax laws "interest paid" is an allowable deduction in computing taxable income. For a dollar of interest paid, taxpayers with higher marginal tax rates get a larger dollar benefit from the deduction. Income-contingent repayments include, in theory, an interest component and a repayment of principal component, but which part of any annual repayment represents the deductible interest component is largely an arbitrary matter.

Looking at careers I and II under our graduated tax system we see that persons pursuing career I will suffer higher marginal tax rates at younger ages compared to career II; career II will have higher marginal rates at the later ages. If the Internal Revenue Service were to rule that early repayments under income-contingent loans are "principal" and that later payments are "interest," as is apparently the case under Yale's income-contingent program, then choice of careers may be affected. (See Yale University, 1971, pp. VI-4, VI-6, and VI-8.) The person entering career II is assured that his

[16] Using the notation above (see footnote 15), and letting $(1 - s)$ equal the fraction of annual income that goes to loan repayment, then net annual income is $Y_i^{I''} = (I_0 + mi)s$ and $Y_i^{II''} = (II_0 + ni)s$. Let $PV_{I''}$ and $PV_{II''}$ represent the respective present values of these income streams. Then $PV_I > PV_{II}$ implies that

$$\sum_{i=0}^{45} \frac{I_0 + mi}{(1 + r)^i} > \sum_{i=0}^{45} \frac{II_0 + ni}{(1 + r)^i}$$

If both sides of the inequality are multiplied by the positive constant s,

$$s \sum_{i=0}^{45} \frac{I_0 + mi}{(1 + r)^i} > s \sum_{i=0}^{45} \frac{II_0 + ni}{(1 + r)^i}$$

or

$$\sum_{i=0}^{45} \frac{s(I_0 + mi)}{(1 + r)^i} > \sum_{i=0}^{45} \frac{s(II_0 + ni)}{(1 + r)^i}$$

which is $PV_{I''} > PV_{II''}$ Q.E.D.

It should be noted that the income-contingent repayment tax does change the absolute values of the difference between two-time streams of income, and thus, when combined with our previous analysis of nonpecuniary qualities of careers, career choice may be affected to some extent.

loan repayments during his high marginal tax-rate years will be largely deductible; career I people will have a lower marginal tax during those same years and their dollar tax benefits will be smaller. On the other hand, career I people will repay their principal quicker and thus their tax benefits from deduction of interest will commence in an earlier year than under career II. About all that can be said about these conflicting relations, I believe, is that:

1. Students with a high subjective discount rate (who would have leaned toward career I anyway) would find that the tax provisions on deductibility of interest strengthen their preference for career I, since this career results in early-dated tax benefits.
2. Students with low discount rates (who might have chosen career II, ignoring tax benefits) will find that the tax laws strengthen the advantages of career II, since the undiscounted tax benefits of that career are clearly higher than for career I.

In sum, although loan finance may discourage choice of careers with long training periods, as discussed previously, there is not much reason to believe that patterns of choice among careers of different temporal income pattern would be affected by loan finance.

Earnings Variability

Another job dimension that might concern entrants into the educated labor force is the variability of earnings in a chosen career or job. Other things being equal, people will treat earnings variation as a bad job characteristic. Normally this would imply that mean lifetime earnings would have to be somewhat higher in occupations where earnings show a large variance in order to compensate labor for its distaste for earnings variability.

Suppose now that a job holder is indifferent between a smooth, secularly rising income path (career II) and another income path with high variance of expected annual earnings (career I). Will his indifference be affected if he has contracted educational debt?

We can reinterpret the left-hand panel of Figure 13-1 to be measuring variance of income, with high variance careers plotted near the origin and low variance ones further to the left. Under a conventional loan involving constant annual repayments, the variance of income in both careers is unchanged. Constant repayments subtracted from each career's income stream result in postrepayment income streams with equal variance to the prerepayment income

streams in both cases. But loan repayments also reduce the average postrepayment earnings in both careers by a similar amount. Using the framework of Figure 13-1 conventional loan repayments affect only the utility of income panel. Assuming diminishing marginal utility of (average) income implies that the previously indifferent student making constant annual repayments would switch to the career with higher income—that is, career I, with its higher earnings variability—since the utility loss is less in that career.

Income-contingent loan repayments may strengthen this switch to the career with high earnings variability. If a constant tax rate is applied to the income streams of careers I and II, the variance of the resulting postrepayment income streams will fall. If $(1 - s)$ is the tax rate, variance of income will fall by the fraction s^2 in both cases. Since, by assumption, career I had the higher variance of income to begin with, the absolute reduction in variance of income for that career will be greater than in the stable earning career II. Thus career I's relative attractiveness is enhanced because earnings variability is lowered more and the marginal utility of variance reduction is high for career I. On the other hand, the application of a common tax rate means that the average lifetime income in career I will fall more than in career II and this factor may offset the variance reduction. If both careers are high paying enough to result in "maximum payments" (see p. 438), the reduction in variance effect will dominate and choice of careers with high earnings variability will be encouraged.

Labor Force Effort and Participation

Two issues arise under the heading of labor force effort and participation. One is the work-incentive (leisure-choice) effect of loan financing. The second is the effect of loan financing on the labor force participation of women.

Students who borrow under a conventional loan in order to go to college suffer a reduction in their money incomes attributable to the repayments they must make. If leisure is a normal (noninferior) good, the reduction in income caused by repaying the loan will increase work effort. There is in short, an income effect that operates to raise work effort.

Under income-contingent loan repayments, a similar income effect would tend to stimulate participation in work. However, since the repayment is a function of earnings, there is also a substitution effect operating to reduce work incentives. That is, the repayment rate is, in effect, a reduction in the wage rate and the wage rate is

the price of leisure (i.e., earnings are "taxed" but leisure is not). Thus, in the case of income-contingent loans, there is no a priori way to predict the effects of loan-financing on labor force effort.

The place of women in education-finance plans that emphasize loans has received a great deal of rhetoric, if not attention. I leave aside here the debate over the marriageability and childbearing effects of loans on women borrowers[17] to focus on a woman's decision to participate in the labor force.

Research on the determinants of the labor force participation of married women (single women pose no particular problem) has isolated two major relationships: (1) wives' participation rates are inversely related to husbands' incomes and (2) wives' participation rates are positively related to wives' wage rates.

Empirical evidence seems to indicate that the second relationship is the stronger one. (These findings explain the apparent inconsistency between the cross-sectional data on female workers—showing that higher-income families have fewer female labor force participants—and the time-series evidence—showing a secular rise in female participation even though incomes are growing [see Mincer, 1962].)

Thus, in attempting to assess the impact of student loans on female labor force participation it is important to classify the borrower status of both husbands and wives.

If the husband has borrowed, family income will be reduced because repayments must be made. Other things being equal, this implies that the wives of borrowers are more likely to work. If, in addition, the wife was a borrower the incentive for her to work would be strengthened, for her repayments further reduce family income.

Our previous analysis, however, suggests that all other things are not quite equal. The husband may have chosen a higher-paying occupation as a result of his educational borrowing (or his work effort may have increased) and this choice would serve to reduce the likelihood of his wife's working. We can join the previous analysis with the question under discussion here as follows. When conventional loans are introduced into the system, the family unit will seek higher cash income. Part of that income increase may be realized by one (or both) spouses pursuing a higher-paying career. Both housewifery and leisure become less attractive to the female spouse, but the burden of earning more cash may fall entirely on husbands

[17] See Johnstone and Dresch (1971) for a discussion of some of these issues.

through their pursuit of higher-payment careers or of longer hours of work.

If the husband does not borrow but the wife does, the analysis is essentially the same as the above. Family income is reduced. Someone will choose more cash-remunerative pursuits. It may be the husband or the wife.

Income-contingent borrowing introduces a new element into the picture. If the wife's earnings are subject to the education repayment, as is true in some income-contingent loan proposals, the wage rate of the wife is reduced. In fact, under many income-contingent plans, the earnings subject to the education tax repayment are those of the family. In that case, if either spouse has borrowed, the wage rate of any working spouse is reduced, whether he or she is the one who borrowed. In this event, it is impossible to predict the effect on women's labor force participation. The family faces two contradictory forces. First, the repayment implies that the family is poorer and this would shift all members toward cash-remunerative activities. But since the price of unremunerative activities has been reduced (e.g., for women, working at home is cheaper because their commercial wage rate has been reduced), such activities are now more appealing. Whatever decision the family makes will be shared between the husband and wife, depending on the opportunities available to each. What should be stressed here is that—contrary to the popular view that income-contingent loans will drive women out of the home and destroy the family—income-contingent loans are *less likely* than conventional loans to have that effect.

Yale University's taxing rule under its Tuition Postponement Option complicates matters even further. Under the Yale plan, education repayments of a borrower are based on the borrower's *own* income if it is larger than the spouse's income and on one-half of joint income if the borrower's income is less than that of the spouse (see Yale University, 1971, p. VI-3). The most interesting labor force effect of this plan is the incentive it supplies to the work participation of a nonborrowing wife of a Yale borrower husband. Her wages would not be taxed at all until they exceeded the husband's and thus a plausible reaction to the Yale plan is for there to be less income earned by the Yale husband and more by his wife. For the borrowing wife, whose income in our society is likely to be lower than her husband's, Yale's rules imply that her wage rate will be reduced, but by less than would be the case if all joint income were taxed.

These statements are illustrated in Table 13-1. On line 1 we show the repayment requirements under the Yale plan and under a repayment scheme based solely on joint incomes for a one-worker family where the worker is the borrower. If, as in line 2, the nonborrowing spouse earns $5,000, there is no additional repayment liability under the Yale rules. (Under the joint-income repayment rule, spouse *W* might obtain a divorce to avoid the education tax, if such a separation did not involve a too much greater personal income-tax liability.) Indeed, there is every reason under the Yale rules for the family in line 1 to transform itself into a line 3 family, where the nonborrowing spouse earns a substantial share of the family's $15,000 income. Lines 4 and 5 show the asymmetry of the Yale program rules. Families in line 1 and 4 have identical income experience and have each borrowed the same sum, but family 4 has a lower repayment liability. The liability can be further reduced if the two family members share the work burden evenly as in line 5. Thus there are incentives in the Yale repayment scheme for nonborrowing spouses to work and for two-borrower families to share the outside earnings as equally as possible. There would be much less incentive for *W* spouses to work under the repayment rules shown in the last column in which total family income is taxed at each borrower's repayment rate. An unfortunate consequence of the joint-income repayment scheme is that if two single worker-borrowers were married, their repayment liability would increase. This is illustrated best on line 5, where if *H* and *W* were singles their repayments would be $375 each, half the $1,500 liability after marriage.

TABLE 13-1 *Income, borrowing, and repayments under two repayment rules*

Family income	Y_H	Y_W	B_H	B_W	R_1	R_2
1. $15,000	$15,000	$ 0	$10,000	$ 0	$1,500	$1,500
2. 20,000	15,000	5,000	10,000	0	1,500	2,000
3. 15,000	10,000	5,000	10,000	0	1,000	1,500
4. 15,000	15,000	0	5,000	5,000	1,125	1,500
5. 15,000	7,501	7,499	5,000	5,000	750	1,500

NOTE: Y_H = Income of spouse *H*
Y_W = Income of spouse *W*
B_H = Borrowing of spouse *H*
B_W = Borrowing of spouse *W*
R_1 = Repayment rule: Repayment rate applied to borrower's own income or to one-half of joint income, whichever is greater (Yale rule).
R_2 = Repayment rule: Borrower's repayment rate applied to joint income.
The table assumes a repayment rate of .01 per $1,000 borrowed (e.g., 10 percent of income on a $10,000 loan).

Thus, repayment rules in income-contingent loans can be designed to minimize the incentive of wives to work, if that is thought desirable (but only at the cost of encouraging sin!) or they can be set so as to encourage female labor force participation (but only at the cost of some horizontal inequity). In any event, conventional loans are more likely to encourage labor force participation of women than are income-contingent loans.

QUALIFICATIONS AND PUBLIC-POLICY IMPLICATIONS

What are the public-policy implications of any of the labor supply effects of higher-education finance discussed in this paper? This question can be broken into two parts. First, what is the quantitative significance of the factors affected by higher-education finance? Second, what are or should be the goals of public policy in this area?

This paper has presented a long list of predicted directions of change (and a longer list of ambiguous predictions), but the size of the changes are most relevant for policymakers. These quantitative measures of impact are impossible to estimate without both an idea of the size of the policy change contemplated and a great deal more knowledge of economic behavior. Let me illustrate with an example.

We argued above that income-contingent loans may increase or decrease work effort, depending on the income and substitution effects of wage-rate changes. Under a break-even national program of student loans it has been estimated that a 30-year loan with an "opt-out" interest rate of 9 percent would require a tax of .008 per dollar of income per $1,000 borrowed.[18] If we are talking about shifts to loan financing that might require many students to borrow $5,000 during their college careers, this implies a marginal tax rate of 4 percent. It is hard to believe that a tax of this magnitude could have any significant effect on work effort. On the other hand, a really substantial shift to loans, and a reliance on large annual-loan amounts to induce poor students to enroll in college, might imply that a couple would accumulate $20,000 (eight student-years at $2,500) over an education career. If all joint income were taxed, this would imply a marginal tax tate of 16 percent, which, when added to ordinary federal, state, and local marginal tax rates, adds up to a very impressive total indeed. In this case, work-effort effects are surely something to be concerned about and to merit policy attention.

Another quantitative factor that the reader should keep in mind

[18] See Dresch and Goldberg (1972, pp. 59–92, fig. 4). I assume a 4 percent rate of inflation.

is the responsiveness of labor markets to the kinds of change in labor supply discussed in this paper. Most of the relationships analyzed were impact effects of higher-education finance changes. To understand fully the long-run consequences of any of the impact changes, we would need a detailed understanding of how the submarkets for labor adjust, and how employers' behavior might change in response to a change in educational finance. For example, it is not inconceivable that employers might react to an income-contingent loan program by offering to repay student loans as a fringe benefit of employment. Were that the case, some of the educational costs of college-student borrowers might be shifted to other members of the labor force. Alternatively, industries that are college-labor intensive might be pressured into increasing other forms of fringe benefits that would escape the education repayment charge. The point here is that the market response to many of the labor supply impacts discussed in this paper can take on a variety of forms and the impact effects—even if they are quantitatively significant—are not the end of the story.

What can be said about the labor market implications of the three alternative financing strategies outlined earlier in this paper?

The private-share emphasis will tend to reduce investment in human capital, especially among low-income groups. There may be some tendency for career choices to be biased toward cash rewards, greater work effort, and greater labor force participation of women, especially under conventional loans. Risky jobs may become more attractive, especially if income-contingent plans are introduced. Greater choice of institution by students will increase the chances that training is responsive to labor market signals.

A student-grant focus, which we have associated with a federal strategy, would mainly affect the macro aspects of labor supply. College entrance would be encouraged, especially among children of low-income families. If grants were portable, persistence rates might be raised and "freedom of choice" would have the same beneficial effects on institutional responsiveness as the loans route. Career choices among fields would not be affected compared to the present financing arrangements.

Institutional support through state and local government is an inefficient, but partly effective, way of stimulating enrollments through lowered net cost of higher education. Enrollments are boosted and low-income students' participation in higher education is enhanced, but not by as much as targeted subsidies would pro-

duce. The exclusive support of the public sector, often creating a monopoly position for a given institution, is least likely to produce institutional responsiveness to student needs and to labor market signals. Career decisions are independent of the debt-liability effects discussed in this paper.

At the time this paper is being written, the normative aspects of public policy toward higher education are extremely unclear. Are bigger enrollments a "good" thing—that is, to be encouraged—in the face of rising unemployment rates for the college trained? Are current career-choice patterns satisfactory, when trained teachers pour into an overfully supplied market? Is higher-education finance the appropriate policy instrument for changing labor market incentives for women?

My response to these questions is to withdraw. There are many criteria that can be used to guide public policy toward the financing of higher education. One is efficiency. That criterion argues strongly toward a student-aid focus for public policy. Another criterion is equalization of opportunity, which at a minimum means raising enrollment rates of children from low-income families. That criterion argues for a greater targeting of aid on lower-income students, which can be accomplished best through a student-grant program. A final, noneconomic criterion, is the maintenance (or restoration) of a political coalition that will support the higher-education system of this country. This criterion suggests to me some form of compromise, such as a combined student grant–student loan strategy, with perhaps some incentives for states to redirect their support.[19]

Implementation of these policy changes in the financing of higher education may disrupt more narrow manpower goals. But the social cost of undoing any serious manpower problem that arises will almost certainly be smaller than the costs of delay in moving to a more rational system of higher-education finance.

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[19] The Education Amendments of 1972 include a provision for federal matching of state scholarship programs that should help in rechanneling state support. See the discussion in Hartman (1972*b*).

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